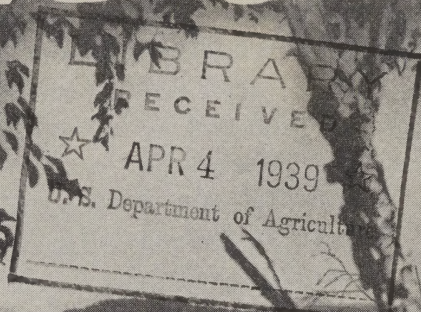


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From RIDGE TO RIVER

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Reserve



United States
Department of
Agriculture
Soil Conservation Service



FOR a number of years soil erosion has been steadily sapping the vitality of rolling farm lands in the upper Mississippi Valley. Of 202 million acres in Illinois, Iowa, Missouri, Minnesota, and Wisconsin, approximately 85 million have lost anywhere from one-fourth to three-fourths of their original topsoil. More than 30 million acres have been severely gullied, and 6 million acres have been stripped down to stubborn, unproductive subsoil.

In spite of these losses, the upper Mississippi Valley is still one of the richest agricultural regions in the world. Even today it contains more than 65 percent of the Nation's grade 1 land. But the fertile soils of Illinois, Iowa, Missouri, Minnesota, and Wisconsin continue to roll down the river. To save the land in these five States and keep it productive is an imperative job, calling for immediate, positive action.

Erosion has long been regarded entirely as a problem of the individual farmer—a problem each man had to face and solve alone. Recently, however, there has been growing recognition of the fact that erosion sets in motion a train of consequences extending far beyond the boundaries of any one farm. Today the idea is gaining ground that soil wastage is a community problem that must be solved by community action. This publication depicts the effects of soil erosion and describes how farmers of the upper Mississippi Valley are combining their efforts for soil defense.



EROSION BEGINS ON THE FARM

EROSION takes place on sloping land whenever water flows over the surface fast enough to move soil particles. All farming practices that speed the downhill course of water naturally hasten the process of soil washing. Straight-row cultivation, continuous cropping, and tillage of steep slopes, for example, lead almost inevitably to eroded soils, lowered fertility, and untillable land.

The two principal kinds of erosion in the upper Mississippi Valley are sheet erosion, in which a sheet of water removes a thin layer of soil more or less uniformly from an area, and gully erosion, in which water concentrates and cuts deep into the soil.

Though gully erosion may be the more spectacular, it is sheet erosion that well-informed farmers fear most. The gradual removal of soil by sheet erosion often escapes the eye of the farmer until crop yields decline or gullies develop. Then it is sometimes too late to repair the damage.

One practice that leads to serious sheet erosion is farming up and down hill. Where run-off water is allowed to concentrate gullies are formed. Enlarging and spreading with every heavy rain, these gullies often destroy large areas.

Furrows left by cultivating up and down hill serve as gutters to carry water away rapidly—and with it goes the soil.





Water has crossed the boundary and is taking the fence.

WATER BREAKS ACROSS FARM BOUNDARIES

RUNNING WATER has no respect for fence lines or farm boundaries. Once it starts downhill, water continues to run until it strikes a barrier strong enough to halt the flow or until the ground levels off. Whenever run-off from eroding land is finally slowed down or halted, it leaves a silt deposit.

Water running uncontrolled on one farm is a serious problem. But by the time it crosses four or five farms, run-off has picked up so much volume and speed that its destructive power is multiplied several times. Holding rain water on the land where it falls is easier and less expensive than taming wild waters downstream.



Whose problem is it now? One rain washed more than 100 tons of topsoil from the field back of the hedge. The soil, stopping in the roadside ditch in the foreground, is now an expense to the community.

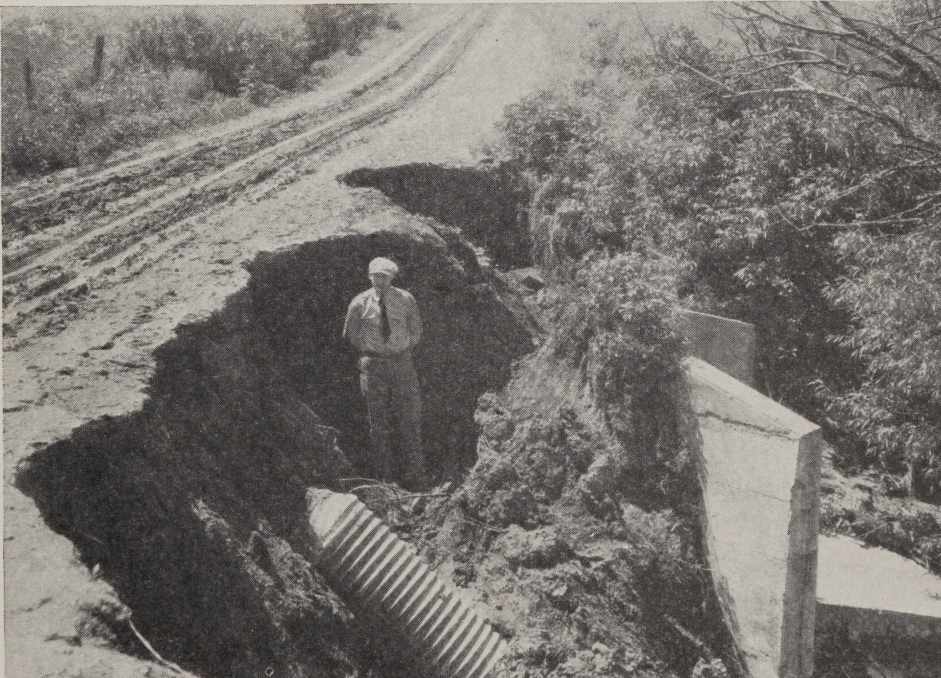
EROSION DESTROYS PUBLIC PROPERTY

UNCONTROLLED WATER is one of the most destructive forces with which man deals. Flowing over unprotected slopes, it slices away the productive topsoil. Collected in large amounts and running at high speed, it destroys roadbeds, bottom land, homes, and other property along its course.

Much tax money has been spent for the upkeep of highways and county roads. Far too large a percentage of this money has been needed to repair the damage of uncontrolled water. One Wisconsin county paid \$25,000 in 1935 to repair damage done to its roads by erosion. That figure represents only wages to workmen.

Extensive cultivation of farm land has aggravated floods on many small streams. Depletion of forest and grassland has added to the enormous amounts of water that rush down the hillsides, overflowing stream banks and causing destruction during the rainy seasons.

Uncontrolled water can be charged with
the expense of repairing this road.





In 1926 this lake was a favorite resort.

SILT REPLACES WATER

DEPOSITS of silt on lowlands, along stream channels, or in reservoirs are a signal that erosion has taken place somewhere—possibly many miles away. Silting, which is one of erosion's aftereffects, is almost as serious as the direct gouging of productive farm lands. In time of floods, silt smothers crops and covers fertile bottom lands. It is dumped on highways and city streets. It ruins trout streams and fills up lakes. Lodged behind dams, it cuts short the useful life of many costly reservoirs built for water storage or electric-power production.

In 1926 Lake Como at Hokah, Minn., was a favorite resort for swimming, boating, and other types of recreation. In 1936 it was



By 1936 the lake had become a worthless mud flat.

completely filled with silt. Soil washed down from the hills was deposited in the lake bed to a depth of several feet. Only a narrow channel was left for the water. In the short space of 10 years, this lake was turned into an almost entirely worthless mud flat. The farmers lost the soil; the village lost the lake.

Behind the dam in Lake Calhoun at Galva, Ill., soil has replaced 52 percent of the original water-storage capacity in 13 years. Silting in reservoirs at West Frankfort and Galesburg, Ill., has destroyed 8 percent of the storage capacity over a 14-year period. Even larger quantities of Illinois soil have traveled down the Mississippi to help build an enormous delta below New Orleans.

WHO PAYS?

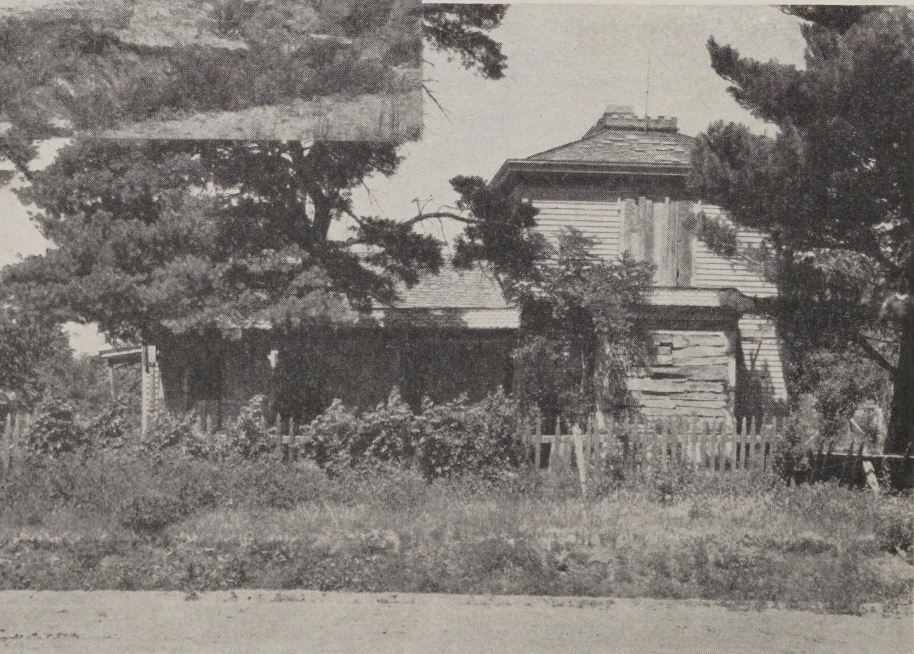
THE most serious result of uncontrolled erosion is not the damage to one farmer's land, not the clogging of a single stream, not the filling of an isolated reservoir. It is the total effect of all this damage both on the farm family and on the community.

For example, take a community in which the farmers are producing on an average \$100,000 worth of farm products every year—enough, let us say, to provide a good living for the farmers and their families and to help support a large number of workers in nearby towns and villages through the farmers' purchases of goods and services. Now suppose that erosion is permitted to destroy the productive land in this community, as it has in many others. Naturally, the income of the farmers drops sharply and with that drop comes a similar decline in all community activities.

Many farms are entirely abandoned as a result of erosion. They no longer provide an income for the farm family or a market for the town's goods and services. Further, as the total value of taxable



The last chapter in the story of erosion:
An eroded farm and abandoned home, a
loss to the community.

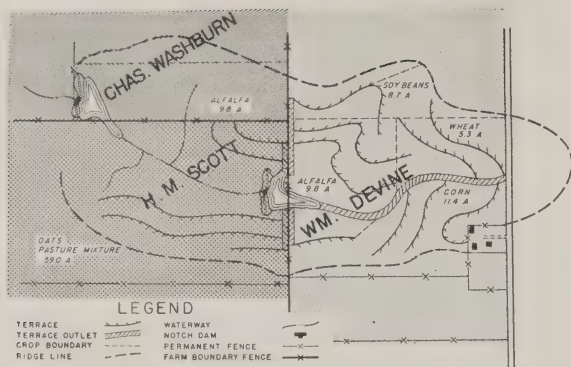


property in the community is reduced through farm abandonment, it becomes necessary either to boost the tax rate or to cut down on such public services as education and road maintenance.

ABANDONMENT OR COOPERATION?

ABANDONMENT of a farm does not solve the erosion problem. In fact, washing usually becomes more serious after erosion has removed the topsoil because there is no fertile soil to produce plant cover that will protect the land. Besides leading to economic and social decline of a community, farm abandonment increases the community's erosion problem and the silting downstream.

The only boundaries that stop erosion are those of a natural drainage area, and boundaries of drainage areas seldom coincide with farm boundaries. Run-off from fields on the upper part of a slope must flow through the farms farther downhill. The upland farmer's responsibility, therefore, does not stop at his fence line. Soil and water permitted to leave his farm may be damaging to his neighbor. For the most effective control, therefore, conservation measures must be applied to an entire drainage area. Farmers within a drainage area can work together to control run-off water all the way from the crests of the ridges to the banks of the streams. This means that the work on each man's land contributes to the protection of farms lying below. The day may come when a good farmer will help keep uncontrolled water from damaging his neighbor's farm just as he now keeps his hogs out of the neighbor's cornfield. Cooperative control is cheaper and more permanent than individual control. Getting together with a neighbor is the first step in erosion control.



The drainage system by which neighbors control sheet erosion and gullying on a small watershed.

THREE FARMERS TAME ONE DRAINAGE AREA

THREE FARMERS in McLean County, Ill., have demonstrated erosion control through cooperative effort in a watershed containing parts of their three farms. These three men, William Devine, H. M. Scott, and Charles Washburn, believe that neighborly cooperation in soil conservation has solved their erosion problem.

Part of Devine's farm makes up the headwaters of the small drainage area, Scott operates the middle part, and Washburn owns the remainder. The map shows the lay-out of the farms. So much water had been going off the field into the central drainageway on the watershed that a gully, which started on the Washburn farm, had cut back along the entire length of the drainageway on the

A 26-foot dam on Washburn's farm.



Scott farm and was rapidly cutting into Devine's field. To keep water on their fields—and out of the gully—these farmers revised their land use, strip-cropped and terraced their fields, and cultivated them on the contour. To care for the excess water that drains off the terraces or enters the drainageway from the pastures and unterraced areas they built two dams in the gullied waterway, one at the head of the gully, and one on the Washburn farm at the point where the gully had started.

They worked out an agreement for dividing the cost of the dams according to the benefit to be gained by each. Devine agreed to furnish 80 percent of the material for the upper dam, which was to be located on Scott's land about 150 feet from the line fence; Scott agreed to furnish the remaining 20 percent of the material for the upper dam and 90 percent of the material for the lower dam, which was built 200 feet from his land on the Washburn place. Washburn furnished the remaining 10 percent of the material for the lower dam.

The pond back of the upper dam receives the water from all the terrace outlets now on the watershed. The water that drains into it is nearly clear, for soil-saving crops and tillage practices are holding the soil on the fields. The pond on the Washburn and Scott farms, reflecting trees and grasses, is a symbol of the successful cooperation of these three farmers in checking sheet erosion.

Working together to treat an entire drainage area as a unit is the principle that underlies successful watershed control, whether the watershed includes 3 farms or 3,000.

The Illinois farmers at one of the dams they built.





Farming on the level helps protect the cultivated field.

SOIL-SAVING PRACTICES PROTECT 10,000 FARMS

THE three Illinois farmers have done what many farmers in soil conservation demonstration areas in the upper Mississippi Valley are doing. They have fitted their soil conservation program for their individual farms to the natural conditions of the land. The first step in establishing such a soil conservation program on a farm in these areas is the making of a survey that will provide the farmer with accurate information on the extent of erosion, types of soil, steepness of slopes, and other land conditions. This information will serve as a basis for developing a complete program of erosion control and water conservation. Careful planning is essential in such a program.

Proper land use is of major importance. Steep slopes and many badly eroded areas should be retired to permanent vegetation, such as pasture, meadow, or woodland. If such land is retired to pasture, it may be necessary to apply soil-improvement measures. Grazing should be so controlled that the plant cover remains uniform and strong. Areas retired to woodland and land already in woods should be protected from grazing and fire. Many small areas may be most profitably used for wildlife food and cover patches.

A good crop rotation that includes legumes and perennial grasses will go a long way toward solving the erosion problem on many farms. Applications of limestone and barnyard manure and other fertilizers, together with the turning under of crop residues and green-manure crops, will improve the physical condition of the soil and aid materially in reducing erosion by making the ground more absorptive.

Conservation practices
and proper land use
control erosion.



Contour farming helps check erosion on cultivated slopes. By operating farming equipment around the slope on the level, the farmer leaves small ridges and furrows directly across the natural line of water flow. Contour strip cropping is another good method for conserving soil and water on moderately sloping land. This practice consists of planting on the contour strips of erosion-resistant grasses, legumes, or other close-growing crops between strips of cultivated crops. The strips of close-growing crops check the speed of run-off water and reduce the extent of sheet washing on the cultivated strips. Maintaining a grass cover in all major drainageways in cultivated fields will prevent concentrated run-off from starting gullies in these drainageways.

Where vegetation provides only partial protection for sloping land, mechanical measures may be used. Terracing is recommended to help control run-off and to prevent sheet and gully erosion on long, cultivated slopes that are not too steep. Other engineering practices, such as the plowing of pasture furrows on the contour or the construction of terrace outlets, dams, and farm ponds, are effective methods of soil and water conservation. One of the principal values of all these mechanical measures is their aid in establishing vegetation.

In the upper Mississippi Valley, conservation programs of this kind are now being carried out on more than 10,000 farms in Soil Conservation Service demonstration areas. Thousands of farmers outside these areas are adopting similar practices on their farms to halt the march of run-off water.



Joint ownership of equipment reduces each farmer's expenses.

COOPERATION IS THE FIRST STEP IN CONSERVATION

FARMERS have found a solution to many problems through organization. They have marketing associations, production credit associations, producers' organizations, and various other community groups that have succeeded because they are based on cooperative action. Today this same principle is being widely applied in soil conservation.

More than 100 voluntary soil conservation associations have been formed in the five States of the upper Mississippi Valley Region to promote erosion-control practices and provide the farmers with a working organization in applying these practices to their own farms. Most of the associations were organized to cooperate with C. C. C. erosion-control camps.

In other cases, farmers have banded together for the purpose of buying or leasing terracing equipment. Some associations have combined terracing work with limestone production and other soil conservation activities. Always the purpose has been to make the job of controlling erosion easier for the individual farmer.

Costs have been cut. Considerable expense is involved when one man undertakes to control erosion by himself. If a group of farmers can pool their efforts to obtain technical assistance, to purchase limestone, to purchase or lease equipment, and can work together in applying recommended practices, soil conservation can be made much less expensive and of greater benefit to the entire community.

Voluntary soil conservation associations have promoted erosion control locally and have helped bring about a widespread interest in soil conservation. They are limited, however, because they lack the legal machinery, the financial resources, and the technical assistance necessary to conduct an intensive erosion-control program.

COMMUNITY ACTION BRINGS PROTECTION

TO CONTROL erosion economically and effectively, a great many farmers need information and assistance, which are more readily available if farmers are banded together in legally organized soil conservation districts. In setting up a soil conservation district, farmers assume the responsibility for planning the program and for applying land use and erosion-control practices to all land within that district.

The soil conservation districts laws enable farmers to organize districts and to direct the development of their own program of soil conservation. Each district may accept technical assistance, grants of money, and other aid from the State colleges, State and Federal Governments, and other cooperating agencies or groups. Details of the laws vary among the States, but the goal is the same—to provide organized farmers with facilities that they can use to control erosion.

Farmers working together in soil conservation districts will have a better understanding of erosion problems and conservation measures. Many other benefits can be expected from a complete erosion-control program in these districts.

Slopes will be protected against sheet erosion.

Invasion of gullies will be checked.

Private and public property will be protected.

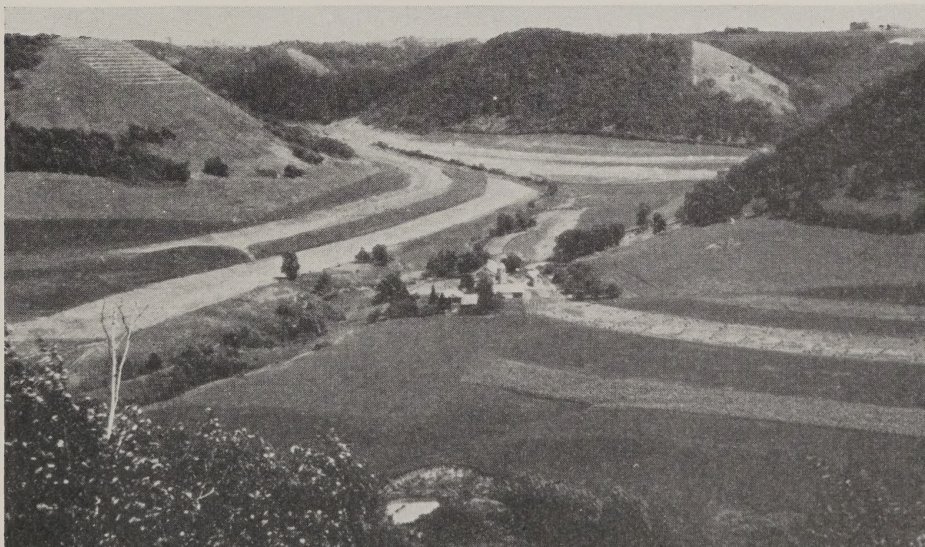
Taxes for road upkeep can be reduced.

Crop yields will be more readily maintained.

Flood damage will probably be lessened.

Farm income will become more stable.

The community profits from organized action against erosion.



How The Districts Laws Work

Under soil conservation districts laws, a State soil conservation committee is set up to receive and pass on every petition for establishing a district. The committee also acts in an advisory capacity to the districts. In most States the farmers, the State department of agriculture, and the college of agriculture are represented on the committee. The law does not require that farmers take any kind of action. It merely makes possible the organization of governmental subdivisions for soil-erosion control.

Farmers who wish to organize a district may petition the State committee and request hearings in the proposed area. If after the hearings have been held there appears to be need of a district the State committee will arrange for a referendum whereby farmers and landowners vote on the question—Shall a district be established? If a certain percentage of those voting (the requirement varies in different States) cast their ballots in favor of establishing a district and the State committee decides that its operation would be practicable and feasible, farmers elect supervisors to manage the affairs of the district. The supervisors will be responsible for outlining and recommending proper land use practices and making the facilities of the district available to farmers. They may make use of technical assistance and other kinds of help. They cannot levy taxes or issue bonds.

Most of the State laws permit the farmers to set up land use regulations by referendum vote. The laws also provide for a board of adjustment, which can make exceptions to these regulations whenever their application would mean hardship to the individual farmers. Landowners and farmers may discontinue a district by a majority vote after a certain length of time (5 years in most States).

M. L. Wilson, Under Secretary of Agriculture, has explained the need for land use regulations as follows: "Land use regulations really are the ordinances of the district, similar to the ordinances which every city, town, or county may adopt. Every one is familiar with county weed-eradication laws, with city zoning ordinances, with town building codes, sanitary regulations, and the like. To these we are accustomed and have come to accept them and consider them as evidence of good housekeeping in government. There is nothing unreasonable about community laws for protecting drinking water, for example. Nor is there anything unreasonable about laws for protecting the land."